

Evaluation Board for 10-Bit, Serial Input, High Precision Digital Rheostats

FEATURES

Full-featured evaluation board for the [AD5270/AD5272](#)
4-wire ohm measurement capability
Various link options
PC control via a separately purchased system demonstration platform (SDP)
PC software for control
50-times programmable (50-TP)
1% resistance tolerance error

PACKAGE CONTENTS

AD527xSDZ evaluation board
AD5270 or AD5272 device
3.3 V voltage regulator ([ADP3303](#))
CD that includes

- Self-installing software that allows users to control the board and exercise all functions of the device**
- Electronic version of the AD5270 data sheet**
- Electronic version of the AD5272 data sheet**
- Electronic version of UG-094**

GENERAL DESCRIPTION

This user guide describes the evaluation board for evaluating the AD5270 and AD5272 digital rheostats. These devices are a single-channel, 1024-position digital rheostat with less than $\pm 1\%$ end-to-end resistor tolerance error and 50-time programmable memory.

The AD5270 and AD5272 support a dual-supply ± 2.5 V to ± 2.75 V operation and a single-supply 2.7 V to 5.5 V operation, making them suited for battery-powered applications and many other applications.

The AD5270 uses a versatile 3-wire serial interface that operates at clock rates up to 50 MHz, and it is compatible with standard SPI, QSPI™, MICROWIRE™, and DSP interface standards.

The AD5272 uses a versatile I²C serial interface that operates in fast mode, allowing speed until 400 kbps. The device allows the selection of up to three different I²C addresses.

The EVAL-AD527xSDZ evaluation board can operate in single-supply and dual-supply mode and incorporates an internal power supply from the USB.

Complete specifications for the AD5270 and AD5272 parts can be found in their datasheets, which are available from Analog Devices, Inc., and should be consulted in conjunction with this user guide when using the evaluation board.

DIGITAL PICTURE OF EVALUATION BOARD WITH SYSTEM DEMONSTRATION PLATFORM

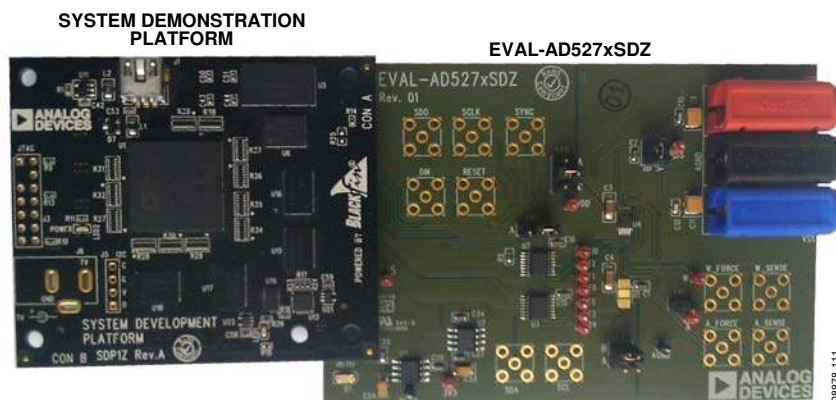


Figure 1.

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REVISION HISTORY

3/11—Rev. 0 to Rev. A

| | |
|---|---|
| Changed System Development Platform to System Demonstration Platform Throughout | 1 |
| Changed EVAL-AD527xDBZ to EVAL-AD527xSDZ Throughout | 1 |
| Changes to Figure 1..... | 1 |

3/10—Revision 0: Initial Version

EVALUATION BOARD HARDWARE

POWER SUPPLIES

The EVAL-AD527xSDZ supports single and dual power supply.

In a single-power supply, the evaluation board can be powered from the SDP port or externally by the J1, J2 and J3 connectors, as shown in Table 1.

If dual-supply mode is required, the J1, J2 and J3 connectors must provide the external power supply, as shown in Table 1.

All supplies are decoupled to ground with 10 μ F tantalum and 0.1 μ F ceramic capacitors.

Table 1. Maximum and Minimum Voltages Connectors

| Connector No. | Voltage |
|---------------|---|
| J1 | Analog positive power supply, VDD. For single-supply operation, it is 2.7 V to 5.5 V. For dual-supply operation, it is 2.5 V to 2.75 V. |
| J2 | Analog GND. |
| J3 | Analog negative power supply, VSS. For single-supply operation, it is 0 V. For dual-supply operation, it is -2.5 V to -2.75 V. |

Table 3. Link Functions

| Link No. | Option |
|------------------------------------|--|
| LK1 | This link connects Terminal A of the digital rheostat to VDD. |
| LK8 | This link selects the positive power supply. Terminal A = 5 V (from SDP). Terminal B = 3.3 V (from ADP3303). Terminal C = the external supply from the J1 connector. |
| LK10 | This link selects the negative power supply. Terminal A = the external supply from the J3 connector. Terminal B = analog GND. |
| LK3 (AD5272 Only) | This link selects the voltage in the ADDR pin. Terminal A = GND. Terminal B = VDD. In single supply only, NC (no connect) = high impedance. |
| LK9 | This link selects whether the EVAL-AD527xSDZ is controlled by the SDP connector via the USB or by the external source via the SMB connectors. Terminal A = SMB connectors. Terminal B = SDP connector. |

LINK OPTIONS

A number of link and switch options are incorporated in the evaluation board and should be set for the required operating setup before using the board. The functions of these link options are described in detail in Table 3. Table 2 describes the positions of the different links to control the evaluation board by PC, via the USB port, using the AD527xSDZ is single-supply mode.

Table 2. Link Options Setup for SDP Control (Default)

| Link No. | Options |
|----------|----------|
| LK1 | Inserted |
| LK8 | B |
| LK9 | B |
| LK10 | B |

EVALUATION BOARD SOFTWARE

INSTALLING THE SOFTWARE

The EVAL-AD527xSDZ evaluation kit includes self-installing software on CD. The software is compatible with Windows® XP, Windows Vista (32-bits) and Windows 7 (32-bits). When users need drivers for 64-bit operating systems, contact Linear.Apps@analog.com.

Install the software before connecting the SDP board to the USB port of the PC. This ensures that the SDP board is recognized when it connects to the PC.

1. Start the Windows® operating system and insert CD.
2. The installation software must open automatically. If it does not, run the **setup.exe** file from the CD.
3. After installation is completed, power up the evaluation board as described in the Power Supplies section. Plug the EVAL-AD527xSDZ into the SDP board and the SDP board into the PC using the USB cable included in the box.
4. When the software detects the evaluation board, proceed through any dialog boxes that appear to finalize the installation.

RUNNING THE SOFTWARE

To run the program, do the following:

1. Click **Start > All Programs > Analog Devices > EVAL-AD527xSDZ > AD527x**. To uninstall the program, click **Start > Control Panel > Add or Remove Programs > AD527x**.
2. If the SDP board is not connected to the USB port when the software is launched, a connectivity error is displayed (see Figure 2). Simply connect the evaluation board to the USB port of the PC, wait a few seconds, click **Rescan**, and follow the instructions.

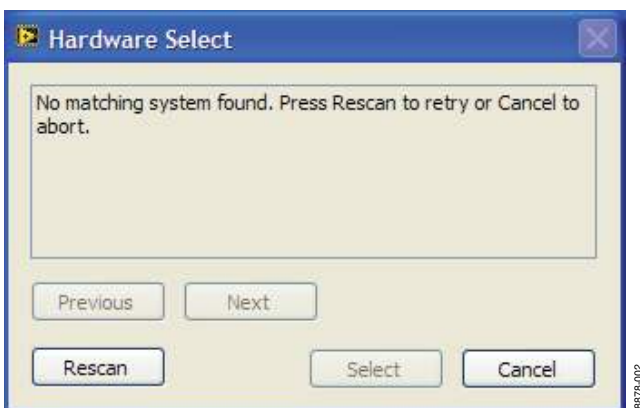


Figure 2. Pop-Up Window Error

3. If the SDP board is not connected to the evaluation boards a message box appears as shown in Figure 3. Check the connection between the SDP and EVAL-AD527xSDZ boards and run the program again.



Figure 3. Error Message

4. For the EVAL-AD5272SDZ only, an additional pop-up window appears, **I2C SELECTION ADDRESS**. The I²C address is selected by LK3, as shown in Figure 4.

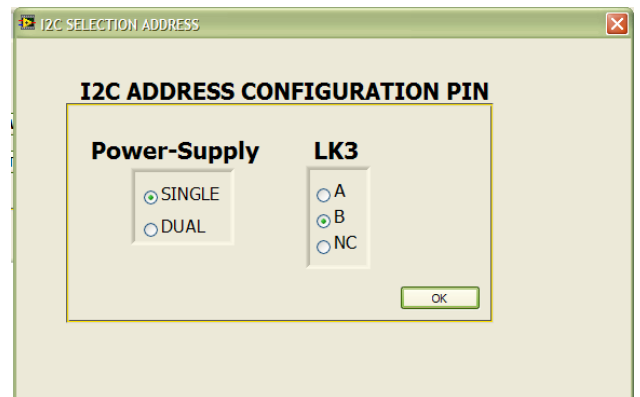


Figure 4. I2C SELECTION ADDRESS Window

The main window of the AD527xSDZ evaluation software then opens, as shown in Figure 5.

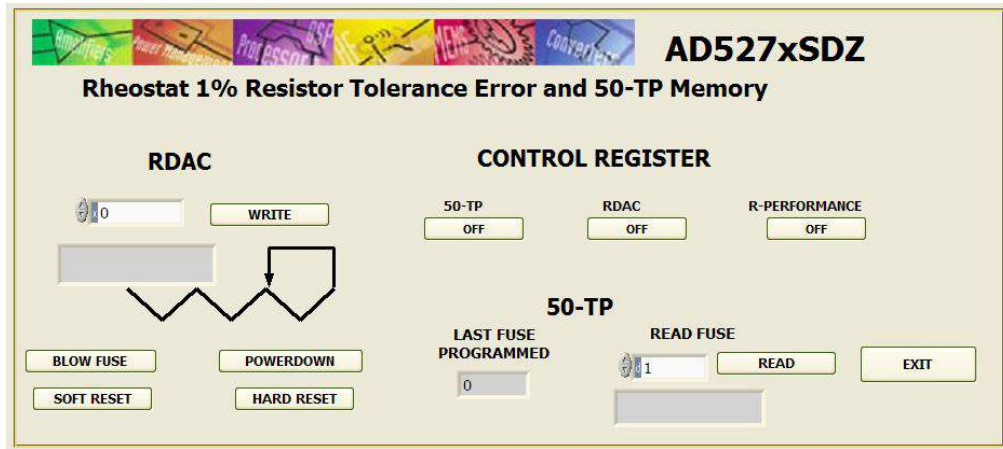


Figure 5. AD527xSDZ Evaluation Board Main Window

SOFTWARE OPERATION

The AD527xSDZ evaluation board main window has three sections: **RDAC**, **CONTROL REGISTER**, and **50-TP**.

These sections do the following:

- The **RDAC** section displays the data that is read from the RDAC, and it is shown in the resistor figure. When users write to the part, this value is updated.
- The **CONTROL REGISTER** section allows access to the control register, enabling or disabling the resistor performance (**R-PERFORMANCE**) mode, **RDAC** write protection, and the **50-TP** memory.
- The **50-TP** section shows the **LAST FUSE PROGRAMMED**, and the data blew into the fuses.

The AD527xSDZ evaluation board main window also includes four buttons that do the following:

- **POWERDOWN** powers down the part. Note that when users click the **POWERDOWN** button, the text of the button changes to **POWERUP**. The button automatically toggles the power-up/power-down bit when it is pressed.
- **SOFT RESET** sends a reset by software.
- **HARD RESET** sends a reset by hardware. Note that this is only available for the EVAL-AD5272SDZ.
- **BLOW FUSE** blows the actual RDAC register data in the **50-TP** memory. When it is successful, the message box in

Figure 6 appears, and when it is unsuccessful, the message box in Figure 7 appears. Before clicking **BLOW FUSE**, remember to enable the **50-TP** memory.

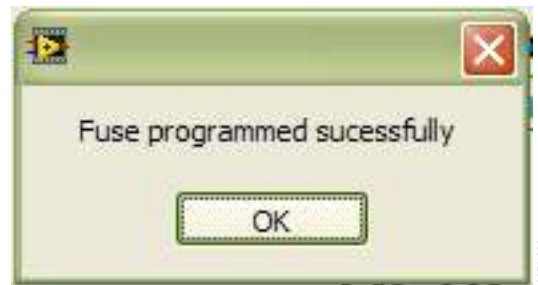


Figure 6. Blow Fuse Successfully

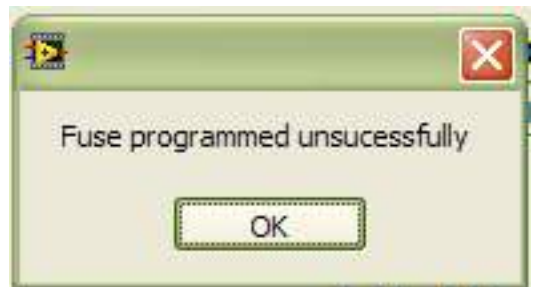


Figure 7. Blow Fuse Unsuccessful

EXIT closes the program. Note that this does not reset the part.

EVALUATION BOARD SCHEMATICS AND ARTWORK

800-82680

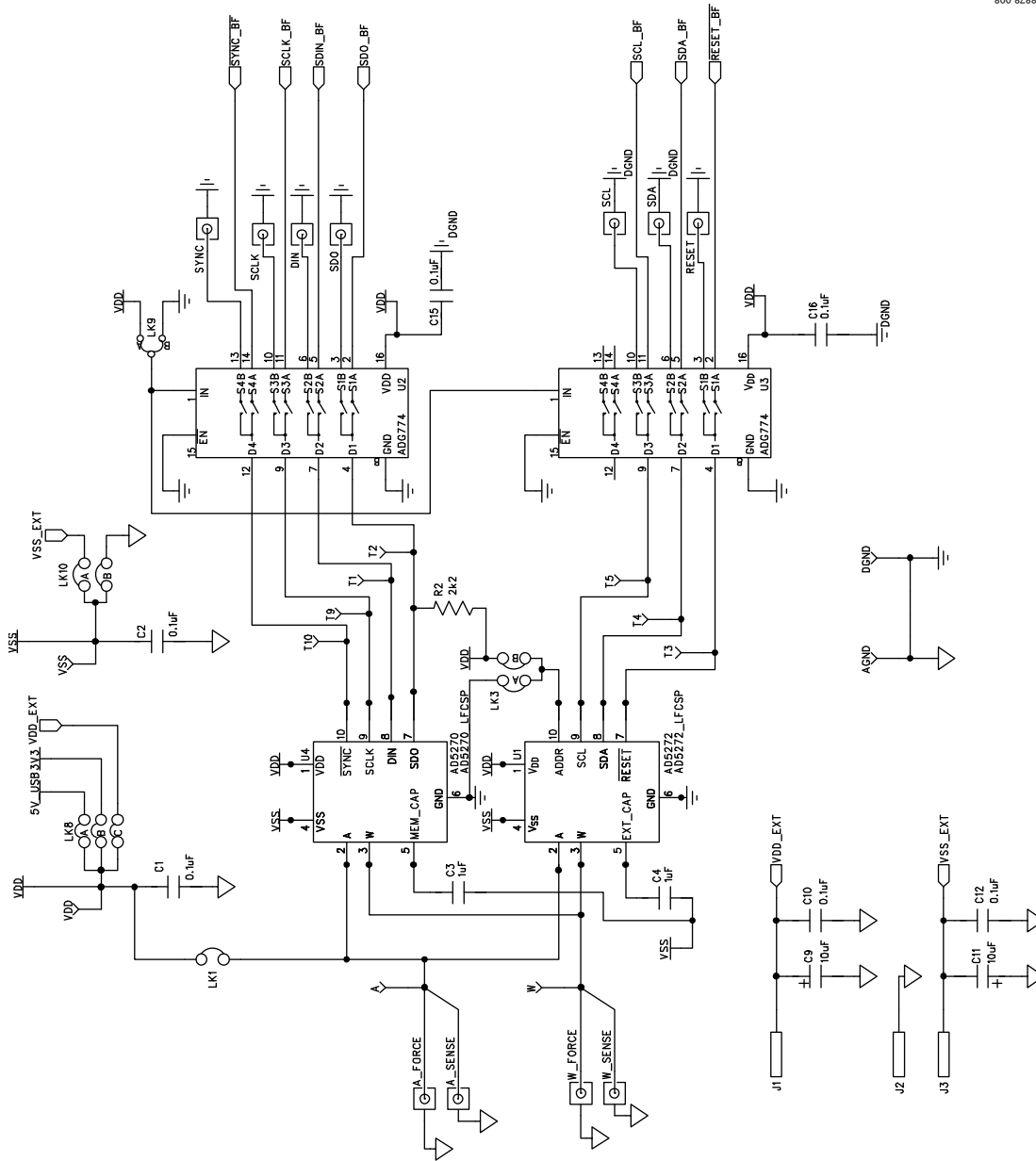


Figure 8. Schematic of AD5270/AD5272 Circuitry

690-878-009

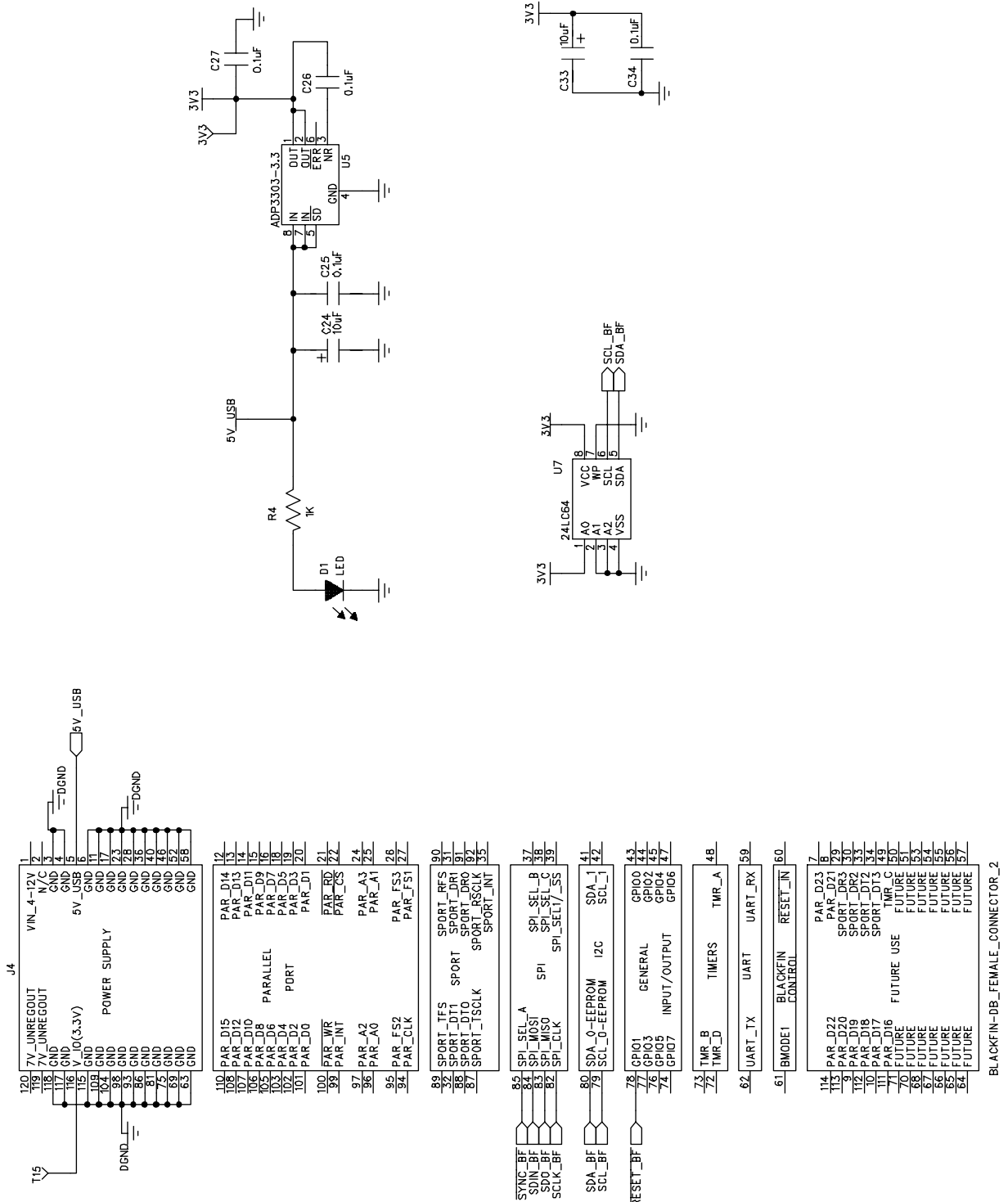


Figure 9. Schematic of SDP Connector

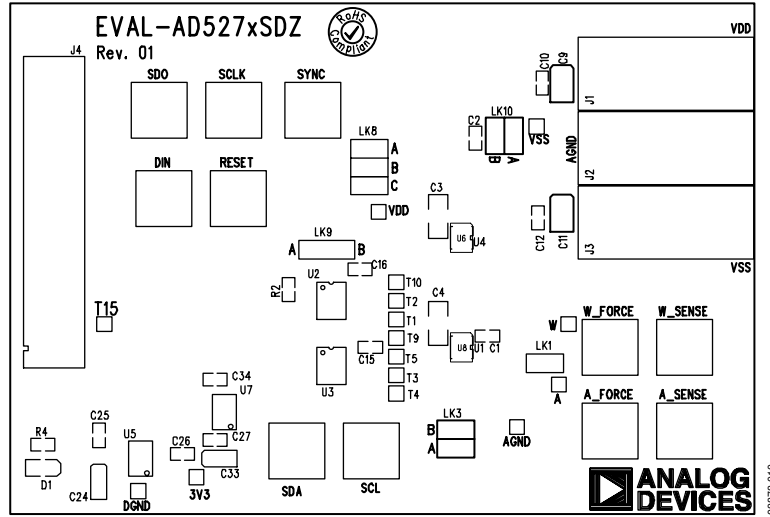


Figure 10. Component Placement Drawing

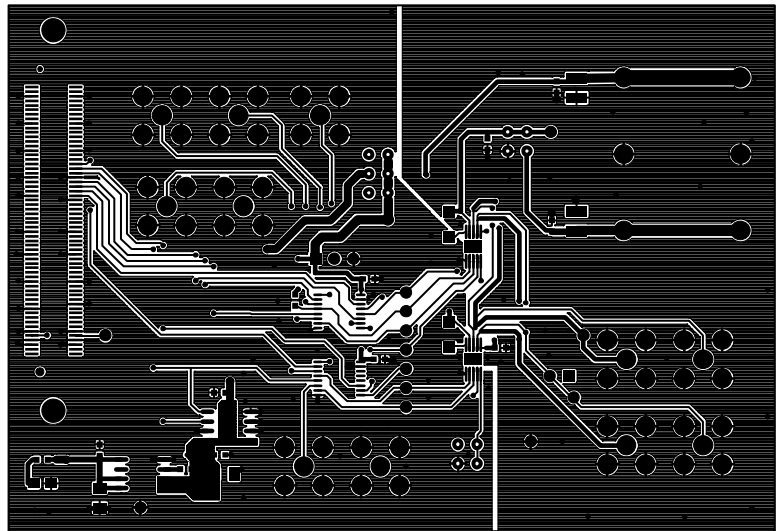


Figure 11. Component Side PCB Drawing

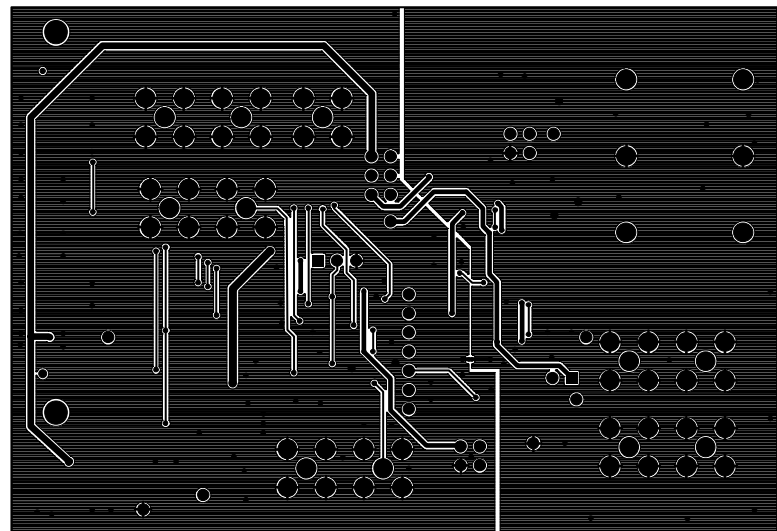


Figure 12. Solder Side PCB Drawing

ORDERING INFORMATION**COMPONENTS LIST**

Table 4.

| Qty | Reference Designator | Description | Supplier/Part Number |
|-----|---|--|------------------------------|
| 6 | C15, C16, C25, C26, C27, C34 | 0.1 μ F capacitor, 0402, 16 V | FEC 301-9482 |
| 4 | C1, C2, C10, C12 | 0.1 μ F capacitor | FEC 138-2224 |
| 2 | C3, C4 | 1 μ F capacitor, 0805, 16 V | FEC 880-5628 |
| 2 | C9, C11 | 10 μ F capacitor | FEC 721-979 |
| 2 | C24, C33 | 10 μ F capacitor | FEC 721-979 |
| 1 | D1 | LED, green | FEC 579-0852 |
| 1 | J1 | Socket, 4 mm, PCB, red | FEC 110-1127 |
| 1 | J2 | Socket, 4 mm, PCB, black | FEC 110-1128 |
| 1 | J3 | Socket, 4 mm, PCB, blue | FEC 110-1130 |
| 1 | J4 | SDP connector | Digi-Key H1219-ND |
| 4 | LK1, LK3, LK8, LK10 | Header 2-row, 36 + 36 way and jumper socket, red | FEC 148-535 and FEC 150-411 |
| 1 | LK9 | Header 1-row, 3-way and jumper socket, black | FEC 102-2248 and FEC 150-410 |
| 1 | R2 | 2.2 k Ω resistor, 0603, 1% | FEC 933-0810 |
| 1 | R4 | 1 k Ω resistor, 0603, 1% | FEC 933-0380 |
| 2 | DGND, AGND | Test point, PCB, black, PK100 | FEC 873-1128 |
| 16 | T1 to T5, T9, T10, T15, VDD, VSS, W, A, 3V3 | Test point, PCB, red, PK100 | FEC 873-1144 |
| 1 | U1 | AD5272 | Analog Devices AD5270 |
| 1 | U4 | AD5270 | Analog Devices AD5272 |
| 2 | U2, U3 | ADG774 | Analog Devices ADG774 |
| 1 | U5 | ADP3303-3.3 | Analog Devices ADP3303-3.3 |
| 1 | U7 | 24LC64 | FEC 975-8070 |

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**ESD Caution**

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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